Amendments to the Claims

　　　This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

What is claimed is:

1-2.　　(Canceled)

3.　　(Currently amended) ~~The apparatus of claim 2,~~ An apparatus, comprising:

　　　a multi-tone receiver to detect data in a multiple tone signal, the receiver having a detector module to measure a noise power level present in the system, and the detector module to detect for an asymmetric Gaussian noise source in the background noise, and

　　　a gain module coupled to the multi-tone receiver to determine a total noise power level for a tone in the multi-tone signal based upon an equivalent noise power algorithm, the gain module to use the equivalent noise power algorithm to compensate the measured noise power level when the detector module indicates that the asymmetric Gaussian noise source exists in the background noise, wherein the detector module generates a scatter plot of noise error over time and the detector analyses a shape of the distribution of the noise error in the scatter plot, and wherein the equivalent noise power algorithm alters the measured noise power level to model a noise power level of a symmetric noise source with a radius equal to a major axis of the shape of the distribution of an asymmetric Gaussian noise error in the scatter plot.

4.   (Canceled)

5.   (Currently amended) The method of claim 11 [[4]], further comprising:

calculating the [[a]] gain factor associated with the asymmetric noise pattern; and

applying the gain factor to the measured noise power level to calculate an

equivalent total noise power.

6.   (Original) The method of claim 5, further comprising:

determining a signal-to-noise ratio based on a signal power of the first tone and

the calculated equivalent total noise power.

7.   (Currently amended) The method of claim 11 [[4]], wherein the multiple tone

carrier signal is a Digital Subscriber Line signal.

8.   (Currently amended) The method of claim 11 [[4]], further comprising:

applying the [[a]] gain factor to an average of the measured noise power level to

calculate an equivalent total noise power of an effective symmetric Gaussian noise

present in the system, if the noise source is generating the asymmetric pattern of noise.

9.   (Currently amended) The method of claim 11 [[4]], wherein determining if the

noise source is generating the asymmetric pattern of noise, comprises:

determining the x axis amplitude of a noise error signal of the tone;

determining the y axis amplitude of the noise error signal of the tone;

determining the value of the correlation between the x axis amplitude and the y axis amplitude components of error; and

determining the average power for the x axis amplitude, average power of the y axis, and the correlation between the x axis amplitude and the y axis amplitude over time, wherein when the average value of the x axis amplitude is significantly different than the average value of the y axis amplitude, then an asymmetric noise source is present.

10.   (Original) The method of claim 9, wherein the average cross-correlation of how the x axis amplitude relates to the y axis amplitude may be calculated as

$$P_c = \frac{1}{N} \sum_{i=1}^{N} (x_i \, y_i)$$

where the error samples are measured over a finite time interval of N samples for each sub channel, and the two main components of the ith measurement are labeled x_i and y_i.

11.   (Currently amended) ~~The method of claim 4, further~~ A method, comprising:

   measuring a power level of noise for a first tone in a multiple tone signal;

   determining a Gaussian noise power level in the first tone and if a noise source is generating an asymmetric pattern of noise; and

   applying a [[the]] gain factor to the measured power level of the noise source with an asymmetric pattern of noise to be equivalent to that of a symmetric noise source with a standard deviation equivalent to the power of the noise source with an asymmetric pattern of noise along its strongest axes.

12.   (Original) The method of claim 5, further comprising:

determining bit-loading based on the signal-to-noise ratio based on the equivalent total noise power.

13.   (Original) The method of claim 5, further comprising:

determining if the gain factor exceeds a first threshold amount;

activating an asymmetric Gaussian noise compensation based on the first threshold; and

deactivating the asymmetric Gaussian noise compensation based on a second threshold, wherein the first threshold is greater than the second threshold.

14.   (Canceled)

15.   (Currently amended) The article of manufacture of claim 20 [[14]], wherein the stored instructions to cause the device to perform further operations, comprising:

calculating the [[a]] gain factor associated with the asymmetric noise pattern; and

applying the gain factor to the measured noise power level to calculate an equivalent total noise power.

16.   (Original) The article of manufacture of claim 15, wherein the stored instructions to cause the device to perform further operations, comprising:

determining a signal-to-noise ratio based on a signal power of the first tone and the calculated equivalent total noise power.

17.   (Currently amended) The article of manufacture of claim 20 [[14]], wherein the multiple tone carrier signal is a Digital Subscriber Line signal.

18.   (Currently amended) The article of manufacture of claim 20 [[14]], wherein the determining if the noise source is generating the asymmetric pattern of noise, comprises:

    determining the x axis amplitude of a noise error signal of the tone;

    determining the y axis amplitude of the noise error signal of the tone;

    determining the value of the correlation between the x axis amplitude and the y axis amplitude components of error; and

    determining the average values for the x axis amplitude, the y axis amplitude, and the correlation between the x axis amplitude and the y axis amplitude over time, wherein when the average value of the x axis amplitude is significantly different than the average value of the y axis amplitude, then an asymmetric noise source is present.

19.   (Original) The article of manufacture of claim 18, wherein the average cross-correlation of how the x axis amplitude relates to the y axis amplitude may be calculated as

$$P_c = \frac{1}{N} \sum_{i=1}^{N} (x_i y_i)$$

Where the error samples are measured over a finite time interval of N samples for each sub channel, and the two main components of the ith measurement are labeled x_i and y_i.

20. (Currently amended) ~~The article of manufacture of claim 14, wherein the stored instructions to cause the device to perform further operations, comprising:~~ <u>A machine-readable medium storing executable instructions to a cause a device to perform operations, comprising:</u>

<u>measuring a power level of noise for a first tone in a multiple tone signal;</u>

<u>determining a Gaussian noise power level in the first tone and if a noise source is generating an asymmetric pattern of noise; and</u>

applying <u>a</u> [[the]] gain factor to the measured power level of the noise source with an asymmetric pattern of noise to be equivalent to that of a symmetric noise source with a standard deviation equivalent to the power of the noise source with an asymmetric pattern of noise along its strongest axes.

21. (Original) The article of manufacture of claim 15, wherein the stored instructions to cause the device to perform further operations, comprising:

determining bit-loading based on the signal-to-noise ratio based on the equivalent total noise power.

22. (Original) The article of manufacture of claim 15, wherein the stored instructions to cause the device to perform further operations, comprising:

determining if the gain factor exceeds a first threshold amount;

activating an asymmetric Gaussian noise compensation based on the first threshold; and

deactivating the asymmetric Gaussian noise compensation based on a second threshold, wherein the first threshold is greater than the second threshold.

23.   (Currently amended) The article of manufacture of claim 20 [[14]], wherein the stored instructions to cause the device to perform further operations, comprising:

applying the [[a]] gain factor to an average of the measured noise power level to calculate an equivalent total noise power of an effective symmetric Gaussian noise present in the system, if the noise source is generating the asymmetric pattern of noise.

24.   (Currently amended) An apparatus, comprising:

means for detecting data in a multiple tone signal;

means for measuring a noise power level present in the system;

means for detecting for an asymmetric Gaussian noise source in a background noise;

means for determining a total noise power level for a first tone in the multiple tone signal based upon an equivalent noise power algorithm; [[and]]

means for using the equivalent noise power algorithm to compensate the measured noise power level if the detector module indicates that the asymmetric Gaussian noise source exists in the background noise;

means for generating a scatter plot of noise error over time;

means for analyzing a shape of the distribution of the noise error in the scatter

plot; and

means for altering the measured noise power level with the equivalent noise

power algorithm to model a noise power level of a symmetric noise source with a radius

equal to a major axis of the shape of the distribution of an asymmetric Gaussian noise

error in the scatter plot